First-Order and Critical Wetting of Alkanes on Water

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Critical wetting has now been observed on a number of different systems. I will focus on long-range critical wetting, for which a continuous divergence of the wetting layer thickness is observed as the Hamaker constant (which accounts for the long-range van der Waals interactions in the system) changes sign. The conclusion of our work is that the continuous divergence has to be preceded by a first-order (discontinuous) transition. Between the two transitions, there is an intermediate wetting state, in which the film is neither microscopic, nor macroscopic; we have dubbed this state " frustrated complete wetting ". Furthermore, our experiments point to a direct connection between the Hamaker constant (that we can calculate) and BOTH wetting transition temperatures (which we cannot calculate easily).